AMENDMENTS TO THE SPECIFICATION

Please amend the specification as follows *(all deletions are bracketed and additions underlined; both are shown in boldface solely for the convenience of reference)*:

On page 1, line 4, please insert the following reference to the previously filed PCT international application:

CROSS-REFERENCE TO RELATED APPLICATIONS

This patent application is a continuation of PCT International Patent Application No. PCT/JP99/05512 filed October 6, 1999.

On page 1, line 17, replace the paragraph beginning "In the prior art," with the following paragraph:

In the prior art, **[as communication providing high security, a]** spread spectrum communication is known **as a communication providing high security**. In a transmitter for spread spectrum communication, for example, digital data to be transmitted is spread over a wide frequency band by using a spreading code having a prescribed length, and then transmitted. In a receiver for spread spectrum communication, by using a code identical with the spreading code of the transmitter, **[a]** **the** correlation between this spreading code and a received spread signal is determined and a correlation output peak is obtained. It is usually called a despreading demodulation to determine the correlation, to obtain a sequence of correlation peaks, and to retrieve the original digital signal based on this. In this despreading demodulation, there are two methods**[, and in the]. In one** method, after detecting a phase difference (synchronization recognition) between local signal generators respectively within the transmitter and the receiver based on time information of the correlation output from a correlator, the despreading demodulation is performed by obtaining the sequence of correlation peaks**[, and in]. In** the other method, the despreading demodulation is performed by obtaining the sequence of correlation peaks directly from the correlator. As **for** the correlator **used** to detect the correlation, for example, a surface acoustic wave (SAW) device such as a surface acoustic wave convolver or a matched filter may be used.

On page 2, line 18, replace the paragraph beginning "In order to realize a spread spectrum" with the following paragraph:

In order to realize a spread spectrum communication with high quality, it is desirable to increase the length of the spreading code**[, and it]. It** is known that by increasing the length of the spreading code, a process gain which is also an index of a suppression level of interference waves in the spread spectrum communication is improved.

On page 2, line 24, replace the paragraph beginning "However, when the length of the spreading code" with the following paragraph:

However, when the length of the spreading code is increased, an interaction length to obtain the correlation is increased, **[and results] resulting** in an increase in size of the surface acoustic wave device, and various **other** problems **[are caused due to this increase]**. For example, in the surface acoustic wave convolver, a longitudinal length (interaction length) L of a convolution region required to obtain the correlation output is expressed by the following equation (1).

$$L=NxV/Rc \qquad (1)$$

On page 3, line 11, replace the paragraph beginning "In the next-generation mobile communication system" with the following paragraph:

In the next-generation mobile communication system such as an IMT-2000, etc., the length of a short code used for an initial synchronization acquisition is 256 bits, and the chip rate is 4 Mcps. Furthermore, since the velocity of surface acoustic wave of a 128 degree rotation Y cut - X direction propagation $LiNbO_3$ which is a typical surface acoustic wave substrate, is 4000 m/s, when a surface acoustic wave **[cnvolver] convolver** is manufactured by using such a piezo-electric substrate, an interaction length L will be 256 mm according to the above equation (1). Generally, when the size of the piezo-electric substrate reaches 100 mm or larger, since the manufacture of the piezo-electric substrate itself is technically difficult, it is very difficult to obtain such a piezo-electric substrate, and even when it is obtained, it will be very expensive.

On page 6, line 19, replace the paragraph beginning "In order to achieve the above object" with the following paragraph:

In order to achieve the above object, a spread spectrum signal processing apparatus **[as set forth in claim 1 in] of** the present invention, comprises a correlator for detecting a

correlation between a spread spectrum signal and a given reference signal, and processes a correlation signal from the correlator, and wherein each of the divided codes obtained by dividing into plurality a spreading code of a prescribed length for despreading the spread signal is applied sequentially to the correlator as a reference signal in accordance with the order of arrangement in the spreading code, and the correlation signal output corresponding to the each of the divided codes is summed, and the result of the summation is output.

On page 8, line 25, replace the paragraph beginning "The spread spectrum" with the following paragraph:

The spread spectrum signal processing apparatus **[as set forth in claim 2]** according to the present invention comprises a correlator for determining a correlation between a spread spectrum signal and a given reference signal, and processes a correlation signal from the correlator, and further comprises control means for controlling the supply of each divided code, which is obtained by dividing a spreading code of a prescribed length into a plurality of divided codes, as a reference signal to the correlator sequentially in accordance with the order of arrangement in the spreading code, and signal processing means for summing the correlation signals output from the correlator and for outputting a summed result.

On page 9, line 24, replace the paragraph beginning "Therefore, for the reason" with the following paragraph:

Therefore, **[for the reason similar to claim 1 mentioned above,]** in the correlator, since it is allowed to perform the correlation processing by using divided codes whose length is shorter than that of the spreading code, there is no need to use a correlator having an interaction length corresponding to the length of the spreading code, and a correlator having an interaction length corresponding to the length of the divided codes may be used.

On page 10, line 6, replace the paragraph beginning "Furthermore, in the spread" with the following paragraph:

Furthermore, in the spread spectrum signal processing apparatus **[in claim 3]** according to the present invention, the signal processing means **[in claim 2]** comprises an A/D converter for converting the correlation signal into a digital signal, memory means for storing

the digital signal from the A/D converter as digital data, and a signal processor for summing the digital data corresponding to the each divided code and outputting a result of the summation, and wherein the signal processor starts the summing of the digital data by making reference to the timing at which the control means applies the each divided code to the correlator.

On page 11, line 3, replace the paragraph beginning "Furthermore, in the spread spectrum signal processing" with the following paragraph:

Furthermore, in the spread spectrum signal processing apparatus **[in claim 4]** according to the present invention, the signal processing means **[according to claim 2]** comprises a plurality of delay elements each for delaying a signal by a time duration corresponding to the length of the divided code, and the plurality of delay elements are connected in cascade, and the output of the correlator is connected to the input of each delay element and to the output of the last stage of the plurality of delay elements.

On page 11, line 20, replace the paragraph beginning "Furthermore, in the spread spectrum signal processing means" with the following paragraph:

Furthermore, in the spread spectrum signal processing apparatus **[as set forth in claim 5]** according to the present invention, the signal processing means **[in claim 2]** comprises a plurality of delay elements each for delaying a signal by a time duration corresponding to the length of the divided code, and an adder for summing a delayed signal from each delay element and the correlation signal, and wherein the delay elements are connected in cascade, and the output of the correlator is connected to the input of the delay element at the first stage.

On page 12, line, 11, replace the paragraph beginning "Furthermore, in the spread spectrum signal processing" with the following paragraph:

Furthermore, in the spread spectrum signal processing apparatus **[as set forth in claim 6 according to the present invention, in the spread spectrum signal processing apparatus according to any one of claim 1 to claim 5]**, any divided code has the same length.

On page 12, line 20, replace the paragraph beginning "Furthermore, in a spread spectrum signal processing" with the following paragraph:

Furthermore, in the spread spectrum signal processing apparatus **[as set forth in claim 7 according to the present invention, in the spread spectrum signal processing apparatus according to any one of claim 1 to claim 6]**, the correlator is a surface acoustic wave convolver, and the each divided code has the same length as or shorter length than the code length corresponding to the interaction length of the convolver.

On page 13, line 17, replace the paragraph beginning "Furthermore, in a spread spectrum signal" with the following paragraph:

Furthermore, in a spread spectrum signal processing apparatus **[as set forth in claim 8 according to the present invention, in the spread spectrum signal processing apparatus in claim 2]**, the control means, until a peak of the correlation signal is detected, controls to generate successively as the reference signal a divided code among the divided codes positioned at a prescribed order in the arrangement of the spreading code, which divided codes being produced by dividing the spreading code of a prescribed length used for despreading the spread signal into plurality, and after a peak of the correlation signal is detected, each of the divided codes is generated as a reference signal sequentially from the next one of the prescribed order in accordance with the arrangement order.

On page 15, line 5, replace the paragraph beginning "On the other hand" with the following paragraph:

On the other hand, in order to achieve the above object, a spread spectrum communication system **[as set forth in claim 9]** according to the present invention is a spread spectrum communication system to perform the communication between at least two communication equipments by a spread spectrum signal, and the communication equipment comprises synchronization detecting means for detecting synchronization of the spread signal, and despreading means for performing despreading on the spread signal by making reference to a synchronization recognition signal from the synchronization detecting means, and wherein the spread spectrum signal processing apparatus according to **[any one of claim 1 to claim 7]** is applied to either one of the synchronization detecting means and the despreading means.

On page 18, line 19, replace the paragraph beginning "The spread spectrum" with the following paragraph:

The spread spectrum signal processing apparatus according to the present invention, as shown in Fig. 1, comprises a correlator 10 for determining a correlation between a spread spectrum signal and a reference signal applied thereto, a reference signal generator 20 for producing the reference signal and applying **the same** to the correlator 10, a detector 30 for shaping the correlation signal from the correlator 10, an A/D converter 40 for converting the correlation signal from the detector 30 into a digital signal at a prescribed sampling frequency, a memory 50 for storing the digital signal from the A/D converter as digital data, a signal processor 60 for performing a signal processing on the digital data of the memory 50, and a control unit 70 for controlling the reference signal generator 20 and the signal processor 60.

On page 19, line 9, replace the paragraph beginning "The correlator 10" with the following paragraph:

The correlator 10 is formed by a surface acoustic wave convolver, **[and it] which** has an interaction length corresponding to a length (16 bits) of 1/16 of a length of a spreading code (for example, a spreading code X) for despreading a spread signal **[, and a]. A** correlation processing of the spread signal and the reference signal is performed as a unit of 1/16 of the length of the spreading code X. In this case, the interaction length L is 16 mm according to the above-mentioned equation (1).

On page 19, line 26, replace the paragraph beginning "The detector 30"" with the following paragraph:

The detector 30 performs a full-wave rectification of the correlation signal from the correlator 10 so that the correlation signal can be digitally converted in the A/D converter 40, and performs a frequency conversion so as to make the correlation signal **[has] to have** a lower frequency.

On page 20, line 13, replace the paragraph beginning "The signal processor" with the following paragraph:

The signal processor 60 upon receiving the timing signal from the control unit 70, starts the summing process of digital data within the memory 50, and outputs summed result. This summing process sums digital data corresponding to each of the divided codes C_1-C_{16} on the basis of the timing at which each of the divided codes C_1-C_{16} is applied to the correlator 10. At this time, the **[storing]** **starting** position of each digital data with in the memory 50 is specified based on the length of each of the divided codes C_1-C_{16} and the sampling rate of the A/D converter 40.

On page 21, line 4, replace the paragraph beginning "First, when the reference" with the following paragraph:

First, when the reference signal oacillator 20 is controlled by the control unit 70, each of the divided codes C_1-C_{16} is applied in this order to the correlator 10 repeatedly as a reference signal. In this case, at a time point at which the divided code C_1 is applied, for example, as shown in Fig. 2, when a spread spectrum signal by a spreading code Y is input to the correlator 10, supposing that the spreading code Y is made up of a plurality of divided codes **[C_1-C_{16}]** **C'_1-C'_{16}** each having a length corresponding to 1/16 of the spreading code Y, in the correlator 10, a correlation process is performed between the divided code C_1 of the spreading code X and the divided codes C'_1 of the spreading code Y, and its correlation signal is output. In the same manner, a correlation process is performed between the divided codes C_2-C_{16} of the spreading code X and the divided codes C'_2-C'_{16} of the spreading code Y respectively, and its correlation signals are output sequentially.

On page 22, line 4, replace the paragraph beginning "On the other hand" with the following paragraph:

On the other hand, in the control unit 70, after performing the control to apply the divided code **[C16]** **C_{16}**, when performing the control to apply the divided code **[C1]** **C_1** again, a timing signal indicative of its timing is output to the signal processor 60. In the signal 60, when the timing signal is input from the control unit 70, the summing process is started to sum the digital data within the memory 50 corresponding to each of the divided codes C_1-C_{16}, and the summed result is output.

On page 25, line 1, replace the paragraph beginning "As mentioned above" with the following paragraph:

As mentioned above, in the embodiment of the present invention, there are comprised the correlator 10 for correlating the spread spectrum signal with the given reference signal, the A/D converter 40 for digitally converting the correlation signal, the memory 50 for storing the digital signal from the A/D converter 40 as the digital data, the signal processor 60 for summing the digital data respectively corresponding to divided codes C_1-C_{16} and for outputting the summed result, and the control unit 70 for controlling the reference signal generator 20 so that the divided codes C_1-C_{16} are applied in this order repeatedly to the correlator 10. The signal processor 60 is designed such that when the control unit 70 performs the control to apply the divided code **[C1]** $\underline{C_1}$ again after performing the control to apply the divided code **[C16]** $\underline{C_{16}}$, the signal processor 60 begins the summing process of the digital data by making reference to the timing signal output by the control unit 70.

On page 26, line 7, replace the paragraph beginning "Furthermore, in the case" with the following paragraph:

[Furthermore, in the case wherein the] **In comparison, in a** correlator 10 **[is]** constituted with a surface acoustic wave matched filter or a digital matched filter, **[since a]** **the** despreading code is fixed, and **[since]** different despreading codes cannot be used in a single correlator **[, even if]. If** it is intended to use the despreading code by dividing it as in the present invention, **[since]** **and because** the divided codes are respectively different, a plurality of correlators corresponding in number to the number of divisions are required. In contrast, in the present embodiment, the correlator 10 is constituted with a surface acoustic wave convolver. By virtue of this, only one correlator 10, which is designed to use the despreading code by dividing it, is required, and in addition since the consumption of electric power is smaller in an analog correlator than a digital correlator, it is possible to achieve a smaller scale of the circuitry, and the reduction of electric power consumption can be attained.

On page 28, line 7, replace the paragraph beginning "The delay element" with the following paragraph:

The delay element DL_1 receives a correlation signal as an input signal from the correlator 10, and delays the input signal by a time duration (for example, 4 μs) corresponding

to a length of each of the divided codes C_1-C_{16} **[,and each]. Each** of the delay elements DL_2-DL_{15} receives a sum of a delayed signal from each of the preceding delay element **[C_1-C_{14}]** **DL_1-DL_{14}** and the correlation signal from the correlator 10, and delays the input signal by the time duration corresponding to the length of each of the divided codes C_1-C_{16} **[,]**. Furthermore, the output of the delay element DL_{15} is connected to the output of the correlator 10, and a delayed signal from the delay element **[C15]** **DL_{15}** and the correlation signal from the correlator 10 are summed.

On page 29, line 3, replace the paragraph beginning "When the correlation" with the following paragraph:

When the correlation signal is sequentially output, the correlation signal which is output corresponding to each of the divided codes C_1-C_{16}, is delayed by the delay element DL_1 by a time duration corresponding to the length of each of the divided codes C_1-C_{16}. As a result, at the output of the delay element **[DL1]** **DL_1**, the correlation signal corresponding to the divided code C_1 and delayed by the delay element **[DL1]** **DL_1,** is summed with the correlation signal which is output corresponding to the divided code C_2, and the summed signal is supplied to the delay element DL_2. Subsequently, at the output terminal of the delay element DL_2, the correlation signals corresponding to the divided codes C_1 and C_2 and delayed by the delay element DL_2 is summed with the correlation signal which is output corresponding to the divided code C_3, and then supplied to the delay element DL_3.

On page 29, line 19, replace the paragraph beginning "In the same manner" with the following paragraph:

In the same manner, at the output terminal of each of the delay elements DL_3-DL_{14}, the correlation signal corresponding to each of the divided codes C_1-C_{14} delayed by each of the delay elements DL_3-DL_{14}, and the correlation signal which is output in correspondence with the divided code C_3-C_{15} are summed and supplied to the next stage delay element DL_4-**[DL_5]** **DL_{15}**. At the output of the last stage delay element DL_{15}, the **[correlaltion]** **correction** signals respectively corresponding to divided codes C_1-C_{15} delayed by the delay element **[DL15]** **DL_{15},** and the correlation signal which is output corresponding to the divided code **[C16]** **C_{16}** are summed and output.

On page 30, line 5, replace the paragraph beginning "Since the process" with the following paragraph:

Since the processing of the correlation signal is performed as mentioned above, when a spread spectrum signal by the same code as the spreading code X is input, at the delay element **[DL15]** **DL_{15}**, the correlation signals which are output corresponding to divided codes C_1-C_{16} are as shown in Fig. 6. Fig. 6 is a time chart showing the correlation signals which are output from the delay element **[DL15]** **DL_{15}** at a point D in Fig. 5, and the correlation signals are taken at one stationary point when the spread signal is input continuously.

On page 33, line 18, replace the paragraph beginning "In the same manner" with the following paragraph:

The delay element DL_1 is designed to receive a correlation signal as an input signal from the correlator 10, and delays the input signal by a time duration corresponding to a length of each of the divided codes C_1-C_{16} **[,and each]. Each** of the delay elements DL_2-DL_{15} receives a delayed signal as an input signal from a preceding stage delay element DL_1-DL_{14}, and delays the input signal by a time duration corresponding to a length of each of the divided codes C_1-C_{16}.

On page 40, line 1, delete the paragraph beginning "In the first, second and third embodiment.

On page 56, line 20, replace the paragraph beginning "In the signal processing" with the following paragraph:

In the signal processing circuit 18, the output peak is detected as a maximum peak level **[Lpk]** **L_{PK}**, and since the detected maximum peak level **[Lpk]** **L_{PK}** is formed by overlapping all the correlation peaks which are output respectively corresponding to the divided codes C_1-C_4, it becomes not less than the standard value α_2, the **[ronization]** **synchronization** acquisition processing is executed.

On page 63, line 19, replace the paragraph beginning "As described in the foregoings" with the following paragraph:

As described in the foregoings, according to the spread spectrum signal processing apparatus **[as set forth in claims 1 to 7]** of the present invention, as compared with the prior art, an advantageous effect is obtained in which in the spread spectrum communication using a long spreading code, the synchronization recognition of the spread spectrum signal and the despreading can be achieved by using a correlator of the size mountable on a portable equipment.

On page 64, line 2, replace the paragraph beginning "Furthermore, according to the spread" with the following paragraph:

Furthermore, according to the spread spectrum signal processing apparatus **[as set forth in claim 6]** of the present invention, in the case where the spreading code is divided by the same dividing number, an advantage is obtained in that a correlator having a minimum interaction length can be used.

On page 64, line 8, replace the paragraph beginning "Furthermore, according to the spread" with the following paragraph:

Furthermore, according to the spread spectrum signal processing apparatus **[as set forth in claim 7]** of the present invention, as compared with the case where the correlator is constituted by a surface acoustic wave matched filter or a digital matched filter, only one correlator is needed when it is desired to use the despreading code by dividing it, and yet, as compared with the case where it is constituted by the digital correlator, an advantage is obtained in that it is possible to achieve a small-sized circuit scale due to small power consumption, and at the same time to reduce the consumption of power.

On page 64, line 19, replace the paragraph beginning "Furthermore, according to the spread" with the following paragraph:

Furthermore, according to the spread spectrum signal processing apparatus **[as set forth in claim 8]** of the present invention, as compared with the prior art, in the spread spectrum communication using a relatively long code length as the spreading code, an advantage is obtained in that it is possible to reduce the synchronization acquisition time required until the synchronization acquisition, and at the same time, it is possible to reduce the

power consumption, and it is possible to perform the synchronization recognition and the despreading relatively accurately while achieving a small-sized circuit scale.

On page 65, line 5, replace the paragraph beginning "In the same manner" with the following paragraph:

On the other hand, according to the spread spectrum signal processing apparatus **[as set forth in claim 9]** of the present invention, as the correlator which is used either in the synchronization recognition means or in the despreading means, there is no need to use a correlator having an interaction length corresponding to the spreading code, and a correlator having an interaction length corresponding to the divided code can be used.